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NEW BUTTERFLIES FROM EAST AFRICA AND THE ITURI FOREST.

By G. D. Hale Carpenter, M.B.E., D.M., F.R.E.S., and T. H. E. Jackson, F.R.E.S.

(With one Coloured Plate.)

The great majority of the specimens herein described were collected by T. H. E. Jackson, who has presented types to the national collection.

Paratypes are in his collection or have been presented by him to the Hope Department, Oxford University Museum.

Charaxes smaragdalis Butler : female form **caerulea** forma n.

Characterized by absence of white from the discal row of spots on the fore wing.

Type.—Fore wing.—Two narrow, bluish white, subapical spots in 6–7 are all that exist of the outer series which in the male extends from area 2 forwards. (In some of the paratypes the series is complete though faintly shown.) None of the blue spots in areas 1*a*, 1*b*, 2, 3, 5, and the end of the cell, show any white and they are of the same tint as the discal band of the hind wing which shows no white suffusion in the costal area as does the typical female *smaragdalis* Butler.

Hind wing.—Like that of the male *S. orientalis* Joicey and Talbot.

On the under surface both wings resemble those of the male *S. orientalis.*

Locality.—Western Uganda : Ankole, Kalinzu Forest, *c.* 5000 feet, October, 1948. Paratypes from Kalinzu, October, 1937, May, 1941, and two in October, 1948 (*T. H. E. Jackson*). A series of male *smaragdalis* shows that some have a decidedly more purplish tint in the blue than others from the same locality. The blue females above described have the markings of the same pure blue shade as in *S. orientalis* males when freshly caught, but in the type specimen and others, which are older, the blue becomes purplish as it is in male specimens of *S. orientalis* from the Katera Forest on the north-west coast of Lake Victoria.

Charaxes smaragdalis orientalis Joicey and Talbot.

Female ne-allotype.—Compared with the female of *smaragdalis butleri* Rthsch., and especially with that of *s. smaragdalis* Butler, this specimen shows great reduction of the discal white band on the fore wing. The general blue colour is much more of a purplish tint than in the other females.

Fore wing.—As in the male there is reduction in size of the pale spots, except for the white subapical spots in areas 6 and 7. The white discal spots are clearly separated from each other by dark veins and much reduced in size. The longest is in area 2 ; its posterior border slopes obliquely backwards and outwards owing to bevelling off internally by the dark basal ground colour ; in *s. butleri* this white spot is in contact with vein 2 along the whole of its posterior border. Along vein 3 this spot in area 2 measures only 4 mm. in *s. orientalis*, but about 10 mm. in *s. butleri.* Other discal spots are similarly reduced, and that in 1*b* is very small and only seen clearly shown in the anterior half of the area ; in 1*a* there is no white spot. The suffusion with blue scales along the inner margin in areas 1*a* and in 1*b*, is about 15 mm. wide along vein 1, thus much wider than in *s. butleri.* There are faint traces of submarginal spots in areas 5.4.3, in series with the two conspicuous subapicals.

Hind wing.—Pattern much as in *s. butleri*, but the discal blue tint, as on the fore wing, is much more tinted with purple ; the black border is of the same width.

Underside.—Fore wing : Reduction of white discal spots very clearly shown. The bevelling off of the posterior border of the spot in area 2 is seen to be due to the black V-shaped mark embracing its inner surface, which is more acutely angled than the same black mark in *s. butleri*.

One female, UGANDA, about 20 miles west of the Buddu coast of Lake Victoria, thick forest near Kakindu hill (*G. D. Hale Carpenter*) 27.vii.1915. In Hope Department. This specimen, which Dr. Karl Jordan has recently seen, was originally thought to be possibly a female of *mixtus* Rthsch. (see 1924, *Proc. ent. Soc. Lond.*, **1923** : lxvii), but Dr. Jordan now agrees that it must be the female of *smaragdalis orientalis*.

Charaxes etheocles **suk** subsp. n. (Plate I, fig. 5).

Both sexes have sharply falcate fore wings, blue-black ground colour, and pale under surface.

Male.—Ground colour intensely blue-black, like that of *lutacea* Rthsch., and deeper than in *violacea* Rthsch. Fore wing narrower and more falcate than in any other form of *etheocles*, although some individuals of *violacea* Rthsch. approach it in this respect. Two pairs of spots on the costa and one spot at end of cell as in male *picta* Rthsch. bluish-white, the outer pair palest. The series of spots which in *picta* and *chanleri* Holl. sometimes runs backwards from the outermost costal spots is not shown. The border of the fore wing is coloured pale grey, divided by the black ends of the veins.

Hind wing.—The border is not so broad as in *picta*, and bluer than in *chanleri*, and of about the same width. In several specimens, proximal to the submarginal line of spots, a faint blue line runs straight from the base of the innermost tail to vein 5.

In *picta*, *chanleri* and *aubyni* Poulton, a similar line is obviously formed of a series of slightly curved lines not joined into one as in the new subspecies.

The underside of both wings is pale, like that of *chanleri* rather than *picta*.

Type and ten paratypes, feeding on fermenting seed-pods of a *Cassia* at foot of small kopje in the Suk country of Uganda, one mile north of the crossing of the Swam River, 4500 feet, January, 1949.

Female.—Three forms of female were associated with the above males, and make a linked series.

(A) f. **kirkoides** forma n. Nearest to form *kirki* Butler, with yellow band on fore wing and a partly yellow, partly white, band on hind wing (Pl. I, fig. 4).

Fore wing.—Narrower and more falcate than in other females, as in the male. The two yellow spots in areas 4 and 5 are united into a bar, of which the middle is suffused with black ; the spots in area 6 are separated by a well-marked black patch extending to the costa. A yellow spot in the cell, present in the type, is not always shown. In areas 2 and 3 a very faint black suffusion indicates distinction between outer and inner series of yellow spots.

Hind wing.—The discal band is yellowish-white on the costa, yellow in areas 6 and 5, and, posterior to that, narrower and white, tinted with blue at the margins.

Underside of both wings like that of *kirki*, but paler.

Type.—Data as for male. Seven paratypes show slight variation, some merging into form B.

(B) Female form **intermedia** forma n. (Pl. I, fig. 3). Two specimens, intermediate between forms A and C, with similar data.

Fore wing.—The pale spots from costa to area 3 all strongly yellow; that in area 2 has its basal half bluish-white, that in 1*b* has a little more bluish-white, and that in 1*a* is almost entirely bluish-white, save for the antero-external angle which is yellow. The spots of the two series are separated by a black bar from costa as far back as the anterior half of area 2. Neither specimen has a spot in the cell.

Hind wing.—Discal band entirely bluish-white, strongly bordered with blue as in form "C." In the type specimen it is as broad as in "C", in the paratype slightly narrower.

The underside shows the same pale character as in the other female forms, "A" and "C."

(c) Female form **achaemenesopsis** forma n. (Pl. I, fig. 2). The name indicates the remarkable resemblance of this form to the *male* of *Charaxes achaemenes monticola* J. & T. (Pl. I, fig. 1); it is black and white, but there is a general tint of blueness.

Fore wing.—Pattern as in the last-mentioned form. The distal series of white spots runs backwards at right angles from the costa through areas 7, 6, 5, and then, becoming blue tinted, bends slightly inwards and converges towards the discal white of the inner row of spots which it meets on vein 2.

It is noteworthy that the angle made by the outer row of spots is more obtuse in this, and the other females associated with it, than in typical *etheocles* Cr. females, and the comparative straightness (which strongly distinguishes these females from those of *ethalion* Bdv.) greatly aids the resemblance to the male of *achaemenes*. Proximal to this row there is a narrow white streak in 7, a white rectangular spot in 6, a shorter one in 5 in line with the last, and one in 4 much more proximally placed. From 3 to 1*a* there is a series of white discal areas increasing in width towards the inner margin of the wing. An external blue border to the white in 1*b*, and 1*b* is a continuation backwards of the outer row of spots now fused with the discal series. In the cell of the type specimen, and some others, there is a minute patch of blue scales in the same position as the equally small, white patch in the single male *achaemenes* captured with these *etheocles*. The marginal white dots of *achaemenes* are only represented in *achaemenesopsis* by a pair of blue-grey spots in 1*b*.

Hind wing.—The discal band, narrower than in *kirki*, is white, strongly tinted with blue posteriorly at the margins. The small submarginal spots bluish-white. The green and red border is narrower than in *kirki*; it is green from the anal angle to the tip of the posterior margin of the anterior tail; along the anterior margin of the tail it is red, but less strongly marked than in *kirki*.

Underside.—The ground colour is pale greyish-brown, agreeing well with that of *achaemenes*. The discal white is strikingly distinct. On the fore wing the two pairs of curved black markings at bases of 1*b* and 2 are strongly emphasized and increase the resemblance to *achaemenes*.

Type and 13 paratypes.—Data as for the male. With these forms of *etheocles* there were captured a male and a very pale female with the spots almost white, of *achaemenes monticola* J. & T. (Pl. I, fig. 1).

Pseudathyma lucretioides sp. n. (Pl. I, fig. 8).

Male holotype.—Expanse of wing 45 mm. General pattern as in other *Pseudathyma* but the pale areas more expanded and light yellow so that the butterfly rather resembles a yellow *Pseudacraea lucretia*. Ground colour brown. The margins of both wings decidedly dentate. The double row of crescentic marginal lines is slightly whiter than the discal pale areas.

Fore wing.—Elongate subapical yellow spots in 8, 6, 5, that in 6 the largest; a small dot of the same series in 4. A discal band of 5 large yellow spots from 6 to 2, of which that in 5 is the longest. An inner-marginal patch in 1*b* and 1*a*, the latter occupying the middle two quarters of the area; the patch in 1*b* narrower at vein 2 than at vein 1, and

thus separated from the patch in 2 by dark ground colour; external to it is a trace of a narrow spot in series with the discal band. At the tornus a slightly reddish area bounded proximally by denser brown forming a spot. The cell is mottled with dark ground colour and lighter yellow, not clearly shown as spots.

Hind wing.—A very narrow, triangular, dark basal area, and a wide discal band of yellow of which the border curves smoothly round to meet the anal margin at the end of vein 1*a*. The ends of the veins are slightly darkened towards the edge of the yellow. The brown border of the wing is of approximately equal breadth from apex to anal angle; there is in it a row of darker submarginal spots, the anterior one in area 7 scarcely defined. Between these and the innermost crescentic whitish lines there is a reddish tint, most noticeable at the anal angle.

Underside.—General pattern as above; ground colour lighter; in the cell of fore wing the mottling more sharply contrasted. The dark area of the hind wing upperside is changed below into four large yellow spots separated by dark lines which bound them distally. The faint spots of the tornus of the fore wing appear as a distinct pair of black spots, and those in the border of the hind wing are also more sharply defined, black externally, and bordered internally with yellowish.

Head.—Palps yellowish, antennae uniformly dark. A white median frontal spot at bases of antennae.

Thorax and abdomen unspotted. Colour of thorax and dorsum of abdomen the same colour as the ground colour of the upper surface of the wings. Ventral surface of abdomen and its extreme tip, the colour of the discal areas of the under surface.

Taken at Malindi, Kenya Colony, June, 1940.

Euptera mirifica sp. n. (Pl. I, fig. 7).

Differs in pattern from all other known *Euptera*.

Male holotype.—Expanse of wings 45 mm. Both wings black at bases, with the dense black spots of the underside showing through. The distal edges of the black sharply defined; beyond it light yellow streaks go out towards the margins. No marginal or submarginal spots.

Fore wings.—Area 1*a*: Base black, remainder yellow shading off into black at the tornus. 1*b*.—Base black to beyond origin of vein 2, then pure yellow merging into black externally. Two interneural black streaks. 2.—Small black basal area anteriorly just extending beyond origin of vein 3, posteriorly reaching to a little beyond anterior margin of basal black in 1*b*. A single black interneural streak runs out from the basal black to the margin of the wing, having on each side light yellow, which narrows towards the margin, and does not reach it. 3.—Like 2, black at the base with a black interneural streak bordered by yellow which does not reach the margin. 4 and 5.—The denser black interneural streak is bordered with yellow very narrowly and faintly. Apical area black, with denser black streaks.

Hind wing.—The basal black does not extend beyond the origin of vein 2, occupying the base of the cell as a dense black spot. The remainder of the cell is yellow, together with the basal angle of area 3, the basal half of area 2, and a little more than half of area 1*c*. Area 1*b* is dull white, 1*a* slightly yellow. As in the fore wing the yellow radiates outwards on each side of the interneural dark streaks; it occupies the basal angle of area 5.

Under surface.—Much paler, the ground colour greyish-brown, in which the dark interneural streaks clearly stand out. The parts which are yellow above are white beneath. Basal areas rusty brown in which the following deep black spots stand out sharply.

Fore wing.—Two in 1*b*, linked by a black streak. A small spot at base of 2. In the cell two equal spots with a more distal third narrow and crescentic; a small round spot beyond it at base of area 4.

Hind wing.—Two in 1*c*, the proximal, smaller one in the rusty brown, the larger distal one projecting into the white discal area. Two in the cell, one in 7.

Head.—Eyes black, palps white. A median glistening white frontal spot at bases of antennae and a small curved white mark on inner side of each eye. A white tuft behind each eye.

Thorax.—A white spot at base of each fore wing and another behind it, nearer midline. Across the metathorax four slightly yellowish spots, and an oblique yellowish spot on each side at the posterior end of the thorax.

Abdomen.—Anteriorly black with a pair of yellow spots ; posteriorly yellow with black tip.

Locality.—Belgian Congo: Ituri forest, Irumu, Epulu, *c.* 3500 feet, (*T. H. E. Jackson*), September, 1946.

Diestogyna luteostriata Baker. (Pl. I, fig. 6.)

Male ne-allotype.—The species is correctly placed by Aurivillius in his first group, but the upperside of the male is much modified.

Fore wing.—Ground colour black, with four narrow bright azure-blue transverse bands as follows. The first, near base of areas 1*a* and 1*b*, rather obscure and terminating on the basal part of the median nerve, proximal to the origin of vein 2. The second, starting on inner margin 5 mm. from the base and running obliquely to end of cell is 1 mm. broad and divided by the veins. The third, beginning 5 mm. from the hind angle of the wing is macular and ends in areas 4, 5, 6 in three small but distinct white dots ; the fourth, 3 mm. from the third, and submarginal, is macular and terminates in area 6. The third and fourth bands run nearly straight across the wing. The cell has the usual dark, oval spots characteristic of the genus, in this case outlined in azure blue.

Hind wing.—Ground colour black with four bright azure blue bands from vein 1*b* to the subcostal vein. The first and second run obliquely across the wing and are about 1 mm. wide, the first meets the second band of the fore wing when the wings are expanded. The second runs across the middle of the wing and the base of area 3. The third and fourth are macular, and respectively post-discal and submarginal ; the separate spots are not more than half a millimetre in width, like those of the corresponding bands of the fore wing.

Underside.—Nearest to that of *Diestogyna goniogramma* Karsch, but in general a lighter tawny. A dark brown median line divides the considerably darker basal area from the rest of the wing ; it is weakly convex on the fore wing, and rather obscure near the inner margin. On the hind wing the median line corresponds to the second blue band on the upperside ; externally it is bordered by pinkish grey scales. The third transverse blue band of the upperside is represented below by a series of small whitish dots, from areas 2–5 on the fore wing, and 1*a* to 6 on the hind wing. An obscure submarginal series of lunulate markings corresponds with the fourth blue band on upperside. In the cell of the fore wing two dark transverse lines outline a spot, and a similar spot lies at the end of the cell. A black dot in the cell of the hind wing has a dark ring distal to it.

Head and antennae black. *Thorax* black with a curved blue line on its posterior margin. *Abdomen* black with two azure blue spots dorsally.

Palps, and underside of thorax and abdomen biscuit brown.

Expanse of wings 38–45 mm. in the series of type and paratypes. Fringes greyish-brown.

Habitat.—Eastern to Central Belgian Congo. Ne-allotype Ituri Forest, Beni, March, 1947 (*T. H. E. Jackson*). Six paratypes in the British Museum (Natural History), eleven in coll. Jackson, and two in the Oxford University Museum from Beni, Irumu and Mambasa in the Ituri Forest.

Diestogyna butleri Aurivillius. (Pl. I, fig. 9).

Male ne-allotype.—Nearest to *D. ribensis* Ward, differing as follows. Sheen on upperside steel-blue instead of purple. The distal line bounding the second dark transverse band on the fore wing, which is the line separating the basal from the distal area, is weakly rounded, whereas in *ribensis* it is sharply angled at vein 4.

The blue area between the second and third dark transverse bands on both wings is narrower than in *ribensis* (2 mm. as against 4 mm.).

Upperside.—Fore wing : Steel-blue, with dark blackish-brown apex and distal margin. Four dark transverse bands, the second differing from that of *D. ribensis* as already described, the third and fourth divided into spots by streaks of steel-blue along the veins. The usual three dark ovate spots in the cell, the first, near the base, being smaller. Minute white spots in areas 6 and 7, between the third and fourth transverse bands. An unusual character is a small triangular dark spot, outlined in steel-blue, at the base of area 2.

Hind wing.—Steel-blue, with blackish-brown marginal band 2 mm. broad, and four dark transverse bands very nearly as in *D. ribensis* ; the second, however, is very broad and almost contiguous with the first. A dark line marks the discocellulars.

Underside shows even closer affinity with *D. ribensis* than does the upperside.

Fore wing.—Powdered with mauve scales along costal margin for a width of 5 mm., which includes the cell ; remainder of wing tawny brown as in *D. ribensis*. The transverse spots in the cell are darker than the ground colour. The median line is prominent and shows the same differences from that of *ribensis* as on upperside. In the distal half of the wing a series of minute pale spots separates the dark bands ; that in area 8 being the most, that in 1*b* the least conspicuous ; there is none in 7 ; the series is continued across the hind wing.

Hind wing.—Three dark bands from costa to inner margin are separated from each other by bands of greyish-mauve very much as in *ribensis*.

The margin is broadly chocolate-brown, whereas in *ribensis* it is tawny. In the cell a minute dark chocolate-brown dot. Fringes of the wings with minute white dots at the veins. Head black above, greyish-mauve below. Palps grey-brown. Antennae black above, brown below.

Habitat.—Eastern Belgian Congo. Ne-allotype, Ituri Forest, Beni, March, 1947 (*T. H. E. Jackson*). Paratypes in coll. Jackson, Beni (8), Irumu (1).

Diestogyna intermixta Aurivillius. (Pl. I, fig. 10).

D. unocellata Beth.—Baker, 1908.

Male ne-allotype.—Aurivillius placed *intermixta* in his third sub-group of the second group, with *gambiae* Feisth., and *amaranta* Karsch on account of its *Catuna*-like female. The male, however, is nearest to *melanops* Auriv. and *doriclea* Drury.

Upperside.—Fore wing : Tawny brown with dark transverse bands as follows : The first forms a triangular mark filling the bases of areas 1*a* and 1*b*. The second, cut into spots by the veins, runs from the costa where it is 2 mm. broad, through the apex of the cell, is obtusely angled at vein 4, and runs to the inner margin, when it is 4 mm. wide. The third band, somewhat obscure anteriorly and more prominent in areas 1*a*, 2, 3, is postdiscal, and runs straight across the wing. The fourth band, submarginal, is composed of rounded spots increasing in size posteriorly ; in areas 4, 5, 6 a lighter dot is on the proximal margin of each dark spot. Margin dark brown, with a series of darker lunules bounding it proximally. In the cell two prominent blackish-brown transverse spots, with paler centres.

Hind wing.—Coloured as fore wing. In area 8 a small circular whitish patch, possibly sex-scales. A broad dark basal area, angled at its margin on vein 7 and again just anterior

to the median vein ; a transverse dark band across end of cell. The third dark band, 4 mm. broad, and complete, is followed successively by the fourth, formed of separate spots, a series of dark linear markings forming a submarginal line, and the broad dark tawny border.

Underside.—Colour much the same as in *D. melanops*, but lighter tawny.

Fore wing.—Two large greyish-mauve spots in the cell, and one just behind, followed distally by a short whitish-grey band and mauve scaling along the costa to the apex. Remainder of wing fuscous brown with slightly darker marginal band 2 mm. broad. The first and second transverse bands show through obscurely from above ; the third is absent, and the fourth consists of rounded dark spots, that in 1*b* largest, the rest diminishing in size towards the costa and ending in minute white dots as on upperside.

Hind wing.—Fuscous brown, somewhat lighter along the costa. A darker marginal band 2 mm. broad, proximally to it an obscure dark crenulated line. In each area a minute white post-discal spot having on its basal side an obscure dark ovate marking corresponding to the third transverse band on the upperside. A prominent black, circular spot in the cell as in *D. melanops*, but about half the size of that of *melanops*. In some specimens, especially females, this spot is kidney-shaped. Fringes of wings brown. The wings are shaped as in *D. doriclea* and *melanops*, the fore wing longer at the anal angle than at the apex, and the hind wing produced at the anal angle.

Expanse of wings 40–45 mm. Head and antennae, thorax and abdomen blackish-brown above. Ventral surface of palps, head and body, light grey.

Distinguished from other species of the genus, except *melanops*, by the conspicuous black spot in the cell of the hind wing below, and from *melanops* by the smaller size of this spot and the fuscous brown upper surface as compared with the red brown of the latter species.

Habitat.—Eastern and Central Congo.

Male ne-allotype, Mombasa District, Epulu, October, 1947.

Paratypes.—Two, Ituri Forest, Irumu, June, 1947, in British Museum (Nat. Hist.). One, Ituri Forest, Beni, October, 1946, in Hope Department, Oxford University Museum. One, Buta District ; 5 Beni, 4 Irumu, in coll. T. H. E. Jackson. All specimens collected by T. H. E. Jackson.

The distribution of all these *Diestogyna* is that experienced by T. H. E. Jackson ; in addition, Aurivillius in " Seitz " gives " Toro " as a locality for *D. butleri*.

Pseudacraea boisduvali **marsabitensis** forma n.

Shows an interesting combination of characters.

Male holotype.—Apical half of fore wing, distal to a line running from costa through the cell on inner side of the large discocellular spot to base of vein 3, then to proximal end of the black streak in area 2, and along it to the outer margin of the wing, is black, and more thinly scaled than in the black part of the western race. In areas 1*a*, 1*b*, 2, and the cell, the red colour, as in the other eastern races, reaches the base of the wing ; it is slightly less pink than in the hind wing, but on all the wings agrees rather with the western than with the eastern race. The black spots are, as in the western race, not ringed with white as they are in the eastern race.

Hind wing.—The submarginal red spots larger than in any other form of *boisduvali*, and fully developed anteriorly as far as area 7. Under surface much the same, but ground-colour of hind wing whiter and the submarginal spots even more conspicuous.

Nearest to *colvillei* Butler, from which it differs chiefly by the much larger submarginal spots on hind wing. Moreover, in *marsabitensis* the hind wing has a linear black mark on the middle of vein 1*b* ; on vein 2 the black mark shows as a pair of spots, instead of a

single spot as in figure of type of *colvillei*, and there is also a small black spot on inner side of veins 3 and 4.

Data.—Kenya Colony : Mt. Marsabit, 4500 feet, February, 1946 (*T. H. E. Jackson*).

Paratypes.—Eight males with same data. Three show a greater approach to the eastern race by a slight development of yellow which, in its maximal development, forms a yellow spot close to margin of area 4, and a smaller triangular spot in area 5, slightly further from the margin.

Female allotype shows the same black, thinly scaled, apical half of fore wing as in male, except for yellowish-white spots in areas 4–5 as in some of the male paratypes ; the yellowish tinge fainter than in male.

Hind wing has the brownish red of the western race, the submarginal spots as in male.

Under surface.—Fore wing whiter than in male ; only basal half of cell and of areas 1*a*, 1*b* showing strongly pink ; outer halves of 1*a*, 1*b* and of the hind wing whitish with faint pink tint along internervular rays. Submarginal spots larger than on upperside.

Data as for male.

Paratypes in coll. Jackson : Eight with same data show varying development of yellowish or whitish tint in areas 4 and 5 of fore wing ; in two the ground colour of hind wing is strongly red-brown, in others the red is less developed.

At the same time and place T. H. E. Jackson took a quite typical male *trimeni* with large subapical orange patch in fore wing areas 3–6, slightly narrowed anteriorly, and with white suffusion on hind wing at apex of cell and bases of areas 1*c*, 2, 3 ; the submarginal spots of hind wing are smaller than in *marsabitensis* and appear as well-developed in area 7 as in other areas, as in a specimen from Umkomaas, Natal, in coll. Jackson. Since *marsabitensis* occurs at the same time and place as typical *trimeni* it can only be considered as a " form," not a subspecies.

Pseudacraea eurytus **rufo-brunnea** forma n.

A striking form not quite similar to any yet described, but nearer to *conradti* (as fig. 67 in Carpenter, 1949) than to any other, though in some ways approaching the forms of *ruhama* (figs. 3–6 of that reference).

Upper surface.—Ground colour a rich brownish black, nearest to Ridgway's (1912, *Color standards*) " Fuscous black." Paler areas of a brownish orange varying in shade from Ridgway's " Hazel " to the lighter " Cinnamon rufous."

Fore wing.—Beyond the cell there is a paler transverse band from the costa as far back as the internervular ray in area 2. Anteriorly this band is narrow (3 mm. on the costa and at bases of areas 6, 5, 4) ; it widens suddenly at vein 4, and reaches a width of 7 mm. in area 3, narrowing slightly behind that. The inner marginal area, compared with that of *conradti* is slightly wider, and more dyslegnic, being much suffused with dark scales anteriorly and at the base. Its external margin is level with the postero-internal angle of the transverse band, in area 3.

Hind wing.—A dark band along the costa extends to the base of the wing, its posterior border passing through the spots at bases of areas 6 and 1*c*, and in mid-cell. There is a broad dark border of about 9 mm. at its widest point on vein 2, narrowing to 5 mm. on the costa. Between these two dark areas is a discal area of the same colour as the areas on the fore wing and paler at its anal end.

Under surface.—Affinity with the female of the form *victoris* Eltr. is strongly suggested by the very large basal triangle of the hind wing, which occupies more than half the costa and extends posteriorly to the same level as does the costal band on the upper surface. Its colour is like that of *victoris*, " madder-brown " (Ridgway). The pattern of the under-surface of the fore wing is much the same as on the upper surface, but the ground colour is slightly paler and the inner-marginal area a little paler externally. On the hind wing the pale discal area is more sharply defined as a band reaching to the costa and somewhat narrower than on the upper surface, as the dark margin is more clearly defined ; it is of a whitish-brown tint (Ridgway's " Pinkish Buff "). The darker border is somewhat suffused with orange-brown scales over its anal half.

Male holotype from Mt. Kenya, Meru, 6500 feet, March, 1949 (*T. H. E. Jackson*).

Bematistes quadricolor **morogoro** subsp. n.

In general appearance the male resembles *quadricolor latifasciata* E. Sharpe, and the female the pale form of *latifasciata*, but in each sex the transverse orange band is distinctly wider. Measured along vein 3, (the posterior margin of area 3) the type specimen gives a length of 8 mm.; in ten paratypes from the same locality the length varied from 7·1 to 8·5 ; mean 7·9. The female allotype gave a measurement of 11 mm., with three other specimens the mean was 10·9, maximum 11, minimum 10·5.

For the subspecies *latifasciata* the figures are as follows :

♂, mean of 10 from the Elgon neighbourhood, 6·2 mm., max. 7·5, minimum 5·5.

♀, mean of 10 from Elgon, Tiriki hills and Mau, 7·3 mm., max. 9, minimum 5.5.

Male holotype and female allotype from TANGANYIKA TERRITORY, Morogoro district, Masakati ; native collector for T. H. E. Jackson, August, 1945. Seven male and two female paratypes, with same data, in Oxford University Museum.

Acraea chilo **magnifica** subsp. n.

Larger than the average *ch. chilo.*

Male holotype.—Expanse of wing 72 mm. The orange marginal spots on fore wing better developed than in *ch. chilo*, especially in areas 1*b*, 2, 3. The black border on the inner side of the spots is narrower.

Under surface.—The fore wing shows the same differences. On hind wing the sub-marginal whitish spots in the black border are larger than in *ch. chilo*, forming equilateral triangles.

Locality.—KENYA COLONY ; Mt. Marsabit, 4000 feet, February, 1946 (*T. H. E. Jackson*).

Female allotype.—Also larger than the average *ch. chilo* ; 72 mm. The general appearance is that of female form *hoeneli* Holl., the black spots of the fore wing being reduced in size in some cases to mere traces. The under surface of hind wing shows the whitish submarginal spots to be somewhat flattened as compared with the male spots.

Locality as male.

Acraea baxteri subsquamia Thurau. Female **f. lutea** forma n.

Holotype.—The areas normally red are yellow.

KENYA COLONY : Northern Frontier District, Mt. Nyiro, 7000 feet, February 1946 (*T. H. E. Jackson*).

Abisara caerulea Riley, 1932.

Described from a single male as a form of *tantalus* Hew. A very uniform series in coll. Jackson, from Belgian Congo, Buta, Yopole, 3500 feet, October, 1946, of five males together with four females shows sufficiently constant characters to be elevated to specific rank.

Male.—All specimens show on the hind wing the light blue patch internal to the pair of apical spots, which are larger than in *tantalus*, and conspicuously marked externally with bright blue scales not shown in *tantalus*. The ocellate spot on fore wing much larger than in *tantalus* and more conspicuously marked with bright blue scales just external to the middle.

Under surface.—The chief difference from *tantalus* lies in the proximal pale band across fore wing, of which the proximal margin in *tantalus* runs straight from mid-costa to vein 2. In *caerulea* it is bowed outwards slightly at vein 4 and the pale band itself is slightly broader from costa to vein 5 than in *tantalus*. The outer band, in four of the five specimens, is slightly wider than in *tantalus*. General ground colour a richer purplish-brown than in *tantalus*.

Female ne-allotype.—The four specimens agree. They do not show the strong purple sheen on the hind wing. The ocellate spot on fore wing better developed than in *tantalus*, but the ocelli of hind wing are large and blue-marked as in the male, which is not the case in *tantalus*.

Under surface shows the same richer purplish brown than in *tantalus*, and the same characters of the proximal border of the pale band, as in the male. The distal pale band is wider, on the average, than in *tantalus*. (Measurements along vein 5: in *tantalus* 2·5 and 3 mm.; in the *caerulea* 4, 3·5, 3 and 3 mm.)

It is, however, not easy to establish definite criteria of difference between the females of *tantalus* and *caerulea*. In the *tantalus* with measurement of 3 mm. just mentioned, the hind wing has the purple sheen, but the ground colour of under surface, richer than in the other specimen, agrees with that of *caerulea*. On the other hand, in a *caerulea* with measurement 3, the proximal border of the proximal band is as little curved as in the above-mentioned *tantalus*.

Male and female paratypes in coll. Jackson.

Mimacraea krausei **karschioides** subsp. n.

Has a remarkable resemblance to *Acraea sotikensis karschi* Auriv. owing to the shape of the pale area on inner margin of fore wing, the band on hind wing, and basal orange streak in cell of fore wing.

Male holotype.—Fore wing: An orange-yellow subapical bar on fore wing completely separated from the inner-marginal area by a band of the dark ground colour which is broader than in most specimens of *krausei poultoni* and not tending to be broken through at its outer end as is usual in *k. krausei* and common in *k. poultoni*.

An inner-marginal area of same colour contracted anteriorly at vein 4, and on inner margin limited at about the middle by the basal black which is solid and not broken up by pale spots as in *k. krausei*, and not cut away in areas 1*a*, 1*b*, as in *k. poultoni*.

The edge of the basal black is not so straight as in *k. poultoni* and more like that of *k. krausei*. A reddish streak along posterior margin of cell, together with a linear mark of the same colour at the bases of areas 2 and 3, and a narrow streak along the median vein at base of 1*b*, shows affinity with *k. krausei*, in which the basal black is considerably broken up by streaks and spots of this colour. This cellular streak is a feature in the mimetic resemblance to *Acraea sotikensis karschi*, of which a specimen was taken at same place and date.

Hind wing.—Discal band of same colour as subapical band of inner-marginal areas of

fore wing. It differs in shape from that of *k. krausei* and *k. poultoni* by having its margin embayed by the projection into it along vein 4 of a tongue from the broad dark border of the wing. The irregular outline thus resembles that of *sotikensis karschi.*

Underside.—The basal black of fore wing is replaced by the reddish colour shown above in the cellular streak, but it is separated from the inner-marginal area.

The replacement of black by reddish at the base on the underside is also shown in *sotikensis karschi,* but in the male *krausei karschioides* the inner-marginal area is also reddish, whereas in *sotikensis* it is light yellow. On the hind wing the radiating V-shaped streaks are well developed, and a little more emphasized than in *k. krausei* or *k. poultoni,* their centres decidedly darker.

Basal spots as in other forms of *krausei.*

Locality.—South Sudan : Imatong Mts., 5000 feet, October, 1938 (*T. H. E. Jackson*).

Paratypes.—Six, same data and place, in coll. Jackson.

Allotype ♀.—Differs from male in much paler yellow ; the subapical area of fore wing almost white ; the reddish streak very small, faint and paler yellow. In these points it follows the female *sotikensis.* On under surface it mimics the *Acraea* better than does its male, as the inner-marginal area of the fore wing is not reddish, but a paler yellow. Hind wing band whitish like that of the female *sotikensis.*

Paratype female from South Sudan ; Acholi Hills, Labuni, October, 1938 (*T. H. E. Jackson*). In coll. Jackson.

Colotis fausta Olivier subsp. **somalica** subsp. n.

Larger than *vi* Swinhoe, and with the fuscous markings even more reduced, giving the appearance of a dry-seasonal form.

♂. *Holotype.—Upper surface :* Bright pinkish orange over all the wings with a very faint brownish suffusion at the apex, just traceable by a few scales along the margin as far back as vein 3. A faint bar of the same fuscous suffusion, separated from the apical area by an oval orange area, runs back from the costa into area 5, where it is represented by a few scales. The small area of modified scales lying in the curve of vein 1 has darker scales scattered over it.

Under surface.—Unicolorous orange, the hind wing slightly paler. Expanse of wings 48 mm.

Italian Somaliland : Mudugh Province, Mustahil, *c.* 1500 feet (*T. H. E. Jackson*), February, 1945.

Paratypes.—Eight specimens Italian Somaliland, Eil Mijurtein, native collector for T. H. E. Jackson, April, 1945.

♀. *Allotype.*—The orange colour is slightly darker, without the pinkish tinge.

Upper surface.—Fore wing : A definite brown border from the apex, where it measures about 5 mm. wide on the costa, to vein 2, where it measures 1 mm. In this brown border there is a series of spots of the ground colour, from area 7 to area 2. As in the male an oval orange subapical area separates the dark border from a short bar reaching from the costa to vein 5, only feebly developed. *Hind wing :* There are traces of brown spots at the ends of veins 3, 4, 5.

Under surface.—Without fuscous markings. Disc of fore wing of same colour as upper surface. Hind wing and margin of fore wing slightly paler. Expanse of wings 45 mm.

Italian Somaliland : Eil Mijurtein, native collector for T. H. E. Jackson, April, 1945. This new subspecies is obviously derived from *vi* at Aden. The

citation of the distribution of *vi* in *Lep. Cat.*, **53** : 387, 1932, as "Aden, Somaliland " is probably an error. There is no previous record for Somaliland in the literature, nor any specimens in the national collection. Mr. E. P. Wiltshire has found *C. fausta* in the Eastern, or Arabian, desert of Egypt. (1948, The Lepidoptera of the Kingdom of Egypt. Part I. *Bull. Soc. Fouad I. Ent.*, **32** : 203–298, 7 pls.).

PLATE I.

FIGS. 1–10.—(1) *Charaxes achaemenes monticola* J. & T. ♂. (2) *Charaxes etheocles suk*, subsp. n. Type ♀ form *achaemenesopsis*. (3) (*suk*, as 2) Type ♀ form *intermedia*. (4) (*suk*, as 2) Type ♀ form *kirkoides*. (5) (*suk*, as 2) Type ♂. All collected by T. H. E. Jackson, January, 1949, on fermenting pods of *Cassia sp.*, Northern Uganda, Suk country, 4400 feet, by road one mile beyond the crossing of the Swam River. (6) *Diestogyna luteostriata* Baker, ♂ ne-allotype. Belgian Congo, Ituri Forest, Beni, March, 1947, T. H. E. J. (7) *Euptera mirifica* sp. n., ♂ type. Ituri Forest, Epulu, 3500 feet, Sept., 1946, T. H. E. J. (8) *Pseudathyma lucretioides* sp. n., ♂ type. Kenya Colony, Malindi, June, 1940, G. W. Jeffery. (9) *Diestogyna butleri* Auriv., ♂ ne-allotype. Data as for 6. (10) *Diestogyna intermixta* Auriv., ♂ ne-allotype. As 7, except date October, 1947.

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A NOTE ON SPEISER'S GENUS *CENTRIONCUS* AND A REVISED DEFINITION OF DIOPSIDAE (DIPTERA: ACALYPTERAE).

By James F. Shillito, B.Sc.

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In the course of examination of specimens in the collections of the British Museum (Nat. Hist.), further examples of this monotypic genus have come to light, and show that this genus is incorrectly placed in the Sepsidae. It is considered advisable to put on record certain morphological details of this interesting intermediate form in order that in any subsequent revision of the Acalypterates, the misleading accounts at present available may be more correctly assessed.

The genus *Centrioncus* was set up by Speiser (1910) for a single species collected by the Swedish Kilimanjaro-Meru Expedition of 1905–6, which he named *C. prodiopsis* and included in the Sepsidae. Unfortunately, no keys were given to indicate his reason for this decision. This author did, however, emphasize its position as an intermediate between the Sepsidae and the Diopsidae, and he even described it as a little *Diopsis* with the head of a *Sepsis*.

Apart from a brief note by Frey (1925) rejecting this genus from the Sepsidae by reason of its setigerous scutellar spines, the only subsequent references that have been traced are to be found in Duda's *Monographie der Sepsiden* (1925) (p. 10 *et seq.*: key on p. 24). Speiser's account is accepted, though comment is expressed that insufficient data were included in it. It is evident that the phrase "head of a *Sepsis*" of the original was taken literally by Duda, but it is apparent from specimens (see fig. 2, *a*) that vibrissae are completely absent and this may be accepted as further evidence against Speiser's placing. Such a view is still further strengthened by examination of the posterior (thoracic) spiracle which in *Centrioncus*, as in Diopsidae and certain other families, has weak hairs (macrotrichia) around its margin and not the few strong bristles characterizing the Sepsidae. Duda (l.c., p. 22) suggested as a possible alternative that it might be included in the Chloropidae,, but the wing venation (see fig. 2, *c*) shows that this cannot be the case.

One is left with the conclusion that the Diopsidae stand in the closest family relationship to the genus—though the following objections might be raised against such a view:

(*a*) The pleurotergal spine characterizing the Diopsidae is replaced by a dome-like swelling.

(*b*) The collar ("prothorax" of some authors) is very much reduced in *Centrioncus*.

(*c*) The eyes are not stalked—though there is some suggestion that the antennae in *Centrioncus* are not so closely placed as in some Sepsidae.

None of these objections seems to carry sufficient weight to justify the erection of a new family and it is therefore proposed to recast the definition of the Diopsidae previously used (Shillito, 1940) and attention is drawn to the very logical sequence which develops in the group thus constituted (Table I).

TABLE I.—*Characters of the Chief Genera in the Family Diopsidae.*

Genus.	Pleurotergite.	Eyestalks.	Wing venation.	Fore-femora.	Thoracic bristles.	Scutellar spines.	Inner orbital bristle.
Centrioncus	Domed	Nil	Alula 5 + 6 to margin	Bristles present	Bristles present	Short with long bristle	Strong
Sphyracephala	Spined	Short	Alula 5 + 6 incomp.				Absent
Pseudodiopsis						Medium with bristle = or shorter	
Diasemopsis							
Diopsina		Long	No alula 5th only	No bristles	Spines but no bristles		Strong
Teleopsis							
Cyrtodiopsis					No bristles	Long without bristles	
Diopsis							Weak

NOTE.—The position of *Pseudodiopsis* is still under review; it is certainly very close to *Sphyracephala*, but if it is to be retained it should be noted that the type of the genus should be cited *P. detrahens* (Walker, 1858) (syn. *cothurnata* (Bigot, 1874))—*fide* E. E. Austen, MS. note in coll. B.M. (N.H.).

FAMILY DIOPSIDAE (redefined).

MUSCIDAE–ACALYPTERAE, in which the head carries two pairs of bristles ("inner orbital" probably = vti (interior vertical) of Hennig (*in* Lindner) (1941) and "outer orbital" probably = vte (exterior vertical)) but *no* vibrissae. In all genera except *Centrioncus* the head is produced laterally to varying degree in both sexes; not only the eyes, but also the antennae are borne on these processes ("eyestalks"). The thorax shows modification of the pleurotergite into a dome-shaped swelling or a well-developed spine; in addition, the scutellum carries two spines and in the genus *Teleopsis* (including *Megalabops* Frey) supra-alar spines are formed; the posterior thoracic spiracle is encircled by weak hairs, but none of these is developed into a bristle. The forefemora are frequently incrassate and bear a double series of small tubercles (sometimes bristles in addition) on the ventral surface. Mid and hindfemora are not specially modified. The wing venation is simple: c, complete; R2+3, R4+5 and M1+2 reaching the margin near the apex of the wing; M4+Cu1 and A1 not always present.

LIST OF GENERA.

Diopsis Linnaeus, 1775.
Teleopsis Rondani, 1875.
Centrioncus Speiser, 1910.
Cyrtodiopsis Frey, 1928.
Sphyracephala Say, 1828.
Diasemopsis Rondani, 1875.
Pseudodiopsis Hendel, 1917.
Diopsina Curran, 1928.

Centrioncus Speiser (figs. 1 and 2).

The brief definition of this genus which follows is based on Speiser's original definition clarified by certain notes and drawings of the holotype (Berlin Museum) very kindly sent by Dr. Willi Hennig, of Dahlem (1947, *in litt.*), and is given here in anticipation that collectors may meet this genus, which as the records given below show, is, more widespread than had hitherto seemed likely.

Definition : DIOPSIDAE (as redefined above) : A primitive genus differing from typical genera of this family since the eyes are *not* stalked.

The head is rather broader than long, with a strongly developed prostomium (prelabrum) (fig. 2, *a*); in all specimens examined the proboscis is extended, but otherwise typical in form. The head bears only two pairs of bristles, presumably homologous with the inner and outer orbital bristles of other Diopsids. The antennae are typically 3-segmented, the arista slightly bulbous at its base.

FIG. 1.—*Centrioncus prodiopsis* Speiser. ♀, side view. (Wing not included.)

The collar is considerably reduced, but otherwise the thorax has the general form of a Diopsid, though, as Speiser notes, the pleurotergal (metathoracic) spine is not developed ; this sclerite is modified into a dome-shaped swelling. The scutellum carries two setigerous spines, the seta being rather longer than the spine (fig. 2, *b*) (in this respect being wrongly likened to *Diasemopsis* by Speiser).

The legs are long and strong, the fore femora somewhat incrassate, carrying the usual small tubercles in a double row on the apical half and in addition two rows of very distinct bristles (as in *Diasemopsis*).

The wing venation (see fig. 2, *c*) is as described, both M4+Cu1 (5th) and A1 (6th) reaching to the hind margin of the wing. The alula is distinct (though not noted in the original description).

The abdomen, as in other DIOPSIDAE, has the first two segments fused dorsally and occupying about half the total length of the abdomen ; in the males, the terminal segments are very strongly reflexed ventrally.

Genotype : *C. prodiopsis* Speiser.

Centrioncus prodiopsis Speiser.

1910, *Die Schwedischen Zoologischen Expedition Kilmandjaro und Meru*, 1905–6 : 191.

The following notes on the colouring of this species are also given by Speiser and have been confirmed by reference to other specimens, though, as in other DIOPSIDAE, much minor variation is shown in the extent of the darkening of head and thorax. Length 5 mm. (approx.).

Head dark reddish-brown, face and lower half of the back of the head orange-coloured, as is also the proboscis. Palpi black.

Antennae bright yellowish-brown, with a dark spot at the base of the arista.

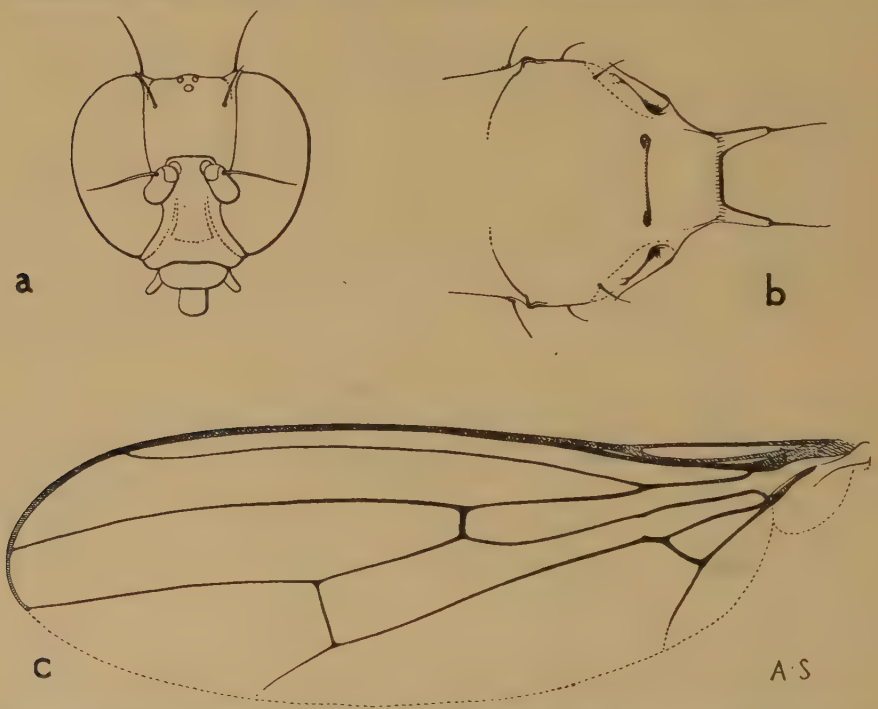

FIG. 2.—*Centrioncus prodiopsis* Speiser. (*a*) Head from the front ; (*b*) thoracic and scutellar spines from above ; (*c*) wing venation. (× = 25).

Thorax black, with humeral callus and a callus between the wing-root and the halteres (? = pleurotergal dome : J. F. S.) dark mahogany-red. Lower side of prothorax near coxae, yellow ; above the middle coxae, on each side, a silvery tomentose spot of roundish shape.

Scutellum black-brown above, its sides and underside yellow.

Legs bright buff, fore tibiae dark brown and at least the last 4 segments of the tarsi snow-white. On middle and hind femora, the apex is darkened at least by lateral brown stripes ; mid and hind tibiae similarly ringed at the base. Forecoxae pale yellow, hind and midcoxae, black.

Wings hyaline with a brownish cloudiness, situated around the short crossvein and most pronounced in the first anal cell.

Halteres whitish yellow.

Abdomen pitch to dark-brown, last three segments of females whitish-yellow.

Distribution.

It will be seen from the following records that this species has never been collected in numbers (as is, for example, *Sphyracephala munroi* Curran in similar localities) and that it is apparently confined to the mountains of Africa ; it may well be considered a primitive member of the relict-fauna of this continent.

Type locality : Kilimanjaro, Kobonoto *circa* 6,000 ft. (♂♂ and ♀♀).

Records of Specimens in Coll. British Museum (Nat. Hist.).

S. Rhodesia : Mt. Chirinda, 3,800 ft, 1910–11, 2 ♂ (*C. F. M. Swynnerton*)
Natal : National Park, iii.1932, 1 ♀ (*J. Ogilvie*).
S. Africa : E. Cape Prov., Kathberg, 4,000 ft., x–xi.1932, 2 ♀ (*R. E. Turner*).
Uganda : Ruwenzori, Kilembe, 4,500 ft., xii.1934, 1 ♂, 1 ♀ (*F. W. Edwards*).
Sudan : Nagichoto, iii.1946, 1 ♀ (*D. J. Lewis*).

Acknowledgments.

In conclusion, I should like to express my grateful thanks to the British Museum (Nat. Hist.) for placing at my disposal the facilities for studying this subject, to Dr. F. van Emden for locating some of the specimens in the material sent to the Commonwealth Institute of Entomology and for his valued help at all times, to Dr. Willi Hennig, of Dahlem, for notes on the holotype, to Mr. A. Smith for the careful drawings illustrating this paper, and finally to Dr. John Smart for his continued interest in this work.

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THE STATUS OF THE GENUS *PERISSOPNEUMON* NEWSTEAD AND DESCRIPTION OF THE NEW GENUS *MISRACOCCUS* (HEMIPTERA: COCCIDAE).

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The genus *Perissopneumon* was erected by Newstead (1900 : 250–251) to include his new species *P. ferox* from N. Konkan, India. This species has never been subsequently re-discovered ; neither were its type slides available to other coccidologists for study. The genus was placed as a synonym of Hempel's genus *Stigmacoccus* by Cockerell (1902 : 233), and was also so considered by Mrs. Fernald in her catalogue of the Coccidae of the World (1903 : 20).

This synonymy was, however, rightly not accepted by Newstead (1908 : 157). Morrison (1928 : 135–138), who had no opportunity to examine the type slides, basing his conclusions on the original description of the species, accepted the validity of the genus *Perissopneumon*, and transferred provisionally to it the species *Lophococcus convexus*, described earlier by him (1920 : 153). Morrison also stated the possibility that the specimens with him from India might agree with the genotype, *ferox* Newstead, and the specimens from Java might be the species described by Vayssière as *Aspidoproctus serrei* (1914 : 334).

Neither Morrison nor the author of the present paper have had an opportunity to examine the type slides of Vayssière's species ; but the latter, during a recent visit to the British Museum, was able to examine the type slides of *ferox*, and it has therefore been possible to arrive at important conclusions, and to state definitely that the genus *Drosichiella* Morrison is actually a synonym of the genus *Perissopneumon*. The latter genus having been described earlier will have to be considered as valid.

Newstead (1911 : 157) had also described *Perissopneumon zimmermani*. Morrison (1928 : 141) thought it possible that this species might be placed in the genus *Pseudaspidoproctus* Morrison. In the author's opinion also *zimmermani* is certainly not congeneric with *ferox*, and would therefore need to be transferred from the genus *Perissopneumon*.

Two papers on *Drosichiella* (*Monophlebus*) *quadricaudata* (Green) by Misra (1939 : 863–871, 872–875) have appeared in recent years without settling the systematic status of the species. This species was first described by Green (1922 : 434) as *Monophlebus quadricaudatus* from three male specimens collected in Ceylon. The present author has had no opportunity to examine the species, and it is therefore not discussed in this paper.

The following species are here regarded as referable to the genus *Perissopneumon* :

Perissopneumon ferox Newstead, 1900.
Monophlebus tamarinda Green, 1908.
Monophlebus phyllanthi Green, 1923.
Drosichiella tectonae Morrison, 1927.

To assist in identifying the species *ferox*, the following recognition characters are given to supplement those already given by Newstead.

Perissopneumon ferox Newstead. (Plate I, figs. 1–8.)

Adult female elliptical, length about 9 mm., greatest width about 6 mm. Antenna eight-segmented. Legs large and stout, covered with a large number of setae (fig. 2); ungual digitules fine pointed at tip; tarsal digitules not seen. Beak three-segmented. Thoracic spiracles large, with disc pores at opening. Abdominal spiracles (fig. 7) in seven pairs, large, with a band of disc pores (numbering about 15–20) in the atrium. Derm covered with hairs, setae and pores with oval to circular areoles around them. Dorsum with circular pores having four, five or six rim loculi and an elliptical centre or having a trilocular-like centre and ordinarily four rim loculi (fig. 1). The latter type are the largest in number. Derm pores on the ventrum are of the above two types but those of type having unilocular elliptical centre and four to eight rim loculi are more common in some regions. Similar pores with five to eight rim loculi are present in the genital region. Area around the genital opening has a large number of hairs. Anal tube short, with a more highly-chitinized circular opening and with a double ring of cerores. With three ventral cicatrices (fig. 8).

This species can be distinguished from the other known *Perissopneumon* species by the predominantly larger number of dorsal pores with trilocular-like centre on the dorsum.

The author has obtained this species in India from Citrus, at Devala and Cherambadi in Madras province, and on the Nelliampathy hills in Cochin State; also on *Melia indica* at Ambur in Madras Province, and on a wild plant at Trichur, in Cochin State.

Misracoccus gen. n.

A new name has therefore to be proposed to include the species now known as *Perissopneumon convexus* (Morrison) and other species allied to it. The author here proposes the name *Misracoccus* for this new genus and includes in it, as shown below, the following different species:

Aspidoproctus serrei Vayssiere, 1914.

Lophococcus convexus Morrison, 1920.

Walkeriana xyliae Green MS., 1930.

Misracoccus assamensis, sp. n.

Genotype.—As *convexus* (Morrison) is the best described species so far, it may be designated as the genotype.

Adults of moderate size, living exposed on the bark and branches of the host; eggs deposited within a large internal marsupium having its opening midventrally; with a dense coating of wax on the dorsum, sometimes with triangular plates projecting out along the margin and in similar but slightly curved wax processes also found on the dorsum, these often rubbed off in nature; broadly elliptical in shape, strongly convex at maturity; derm membranous in early stages and later especially the dorsum becoming chitinized; dorsum densely covered with spines; antennae normally nine- or ten-segmented, stout, tapering, basal segment broader than long; legs stout with few setae on the various segments; claw stout with a pair of digitules; beak stout, conical, single-segmented; thoracic spiracles large, with disc pores at the opening; abdominal spiracles in seven pairs, smaller than thoracic but distinct and with a prominent band of disc pores within their atrium. Dermal pores of several types with unilocular, trilocular and quinquelocular centres, with or without rim loculi. Derm spines numerous, densely crowded

PLATE 1.—*Perissopneumon ferox* Newstead.

(1) Region of the abdominal spiracle showing the pores and setae around it; (2) leg; (3) dorsal seta; (4) ventral seta; (5) ventral pore; (6) pore near the genital opening; (7) abdominal spiracle; (8) ventral cicatrices.

dorsally, large, stout, with swollen bases, with swelling often extending more on one side ; spines on ventrum including those forming a marsupial band, large, stout, pointed at apices ; a few pointed, slender setae also scattered both on the dorsum and the ventrum. Anal tube chitinized, inner end with a double row of wax pores ; area around anal opening with stout pointed spines and pores having a thick outer rim, a plurilocular inner rim and a unilocular centre. Ventral cicatrices numerous, 20–50 arranged in the form of a semicircle made up of a series of individual or group of cicatrices of varying sizes, with a single largest median cicatrice at the posterior end.

Misracoccus xyliae (Ramakrishna Ayyar). (Plate II, figs. 1–20.)

1928, *Walkeriana xyliae* Green *Nomen nudum*, Morrison, *Tech. Bull. U.S. Dept. Agric.* **52** : 227. (The author transfers the species to the genus *Perissopneumon*.)

1930, *Aspidoproctus xyliae* Green MS., Ramakrishna Ayyar, T. V., Contribution to our knowledge of South Indian Coccidae, *Pusa Bulletin* No. 197 (1929) : 69, Plate xxx.

Antenna stout, ten-segmented, widest at the basal segment and tapering gradually towards the apex (fig. 2). Legs well built, small as compared to the size of the insect, with setae on the various segments, ungual digitules pointed at tip (fig. 3) ; with two pairs of large thoracic (fig. 4) and seven pairs of smaller tubular abdominal spiracles (fig. 5). Abdominal spiracles with a collar of pores at the opening. Anal opening small, circular, placed at some distance from posterior end of the body. Anal tube short, with a double row of polygonal pores. Area around anal opening having dermal pores with a thick outer rim, an inner plurilocular rim and a unilocular centre. Ventral cicatrices numerous, in groups, arranged in a semicircle. Body dorsally and towards the margin ventrally covered with a dense covering of stout, closely set, cylindrical setae having slightly dilated rounded apices amongst which are also scattered gland pores usually having a thick rim and a quadrilocular centre (fig. 7). A few pores with a thick outer rim, an inner plurilocular rim and a unilocular or trilocular centre are also seen on the dorsum (figs. 9 and 10). A band of setae and quadrilocular pores (fig. 8) is seen on the ventrum forming a half oval behind the third pair of legs and extending just on the outer side of the cicatrices. A few pores on the outer border of this band are smaller in size and have a trilocular, quadrilocular or quinquelocular centre. A few thin hair-like setae are also present on this band. On the ventrum the pores are of different kinds : (1) simple pores with a quadrilocular centre and without rim loculi (fig. 13)*; (2) simple quinquelocular pores without rim loculi (fig. 14) ; and (3) multilocular pores with a thick outer rim, an inner plurilocular rim and a unilocular, trilocular, quadrilocular or quinquelocular centre (figs. 15–17) ; those with the quadrilocular centre are abundant in the central abdominal region near the cicatrices.

Note.—The authorship of this species is given to Ramakrishna Ayyar for having first figured the external features of the insect.

Hosts and distribution.—The author's record of this species is from *Dodonaea viscosa* at Molakalmuru, Mysore State. It has been recorded by Ramakrishna Ayyar on *Pithecolobium saman* at Coimbatore and on *xylia* stem at Taliparamba, Malabar, South India.

Habit.—Females attached to twigs ; about 12–15 mm. in length, 8–10 mm. in width ; very convex, having a height of about 5–8 mm.

Misracoccus assamensis sp. n. (Plate III, figs. 1–17.)

Antenna nine-segmented, widest at the basal segment and tapering gradually at the top, apical segment longest and basal segment broadest (fig. 2). Legs well developed with a few setae on all segments ; the proportion of the latter can be seen from fig. 3. Only ungual digitules present, pointed at tip. With two pairs of thoracic spiracles (fig. 5)

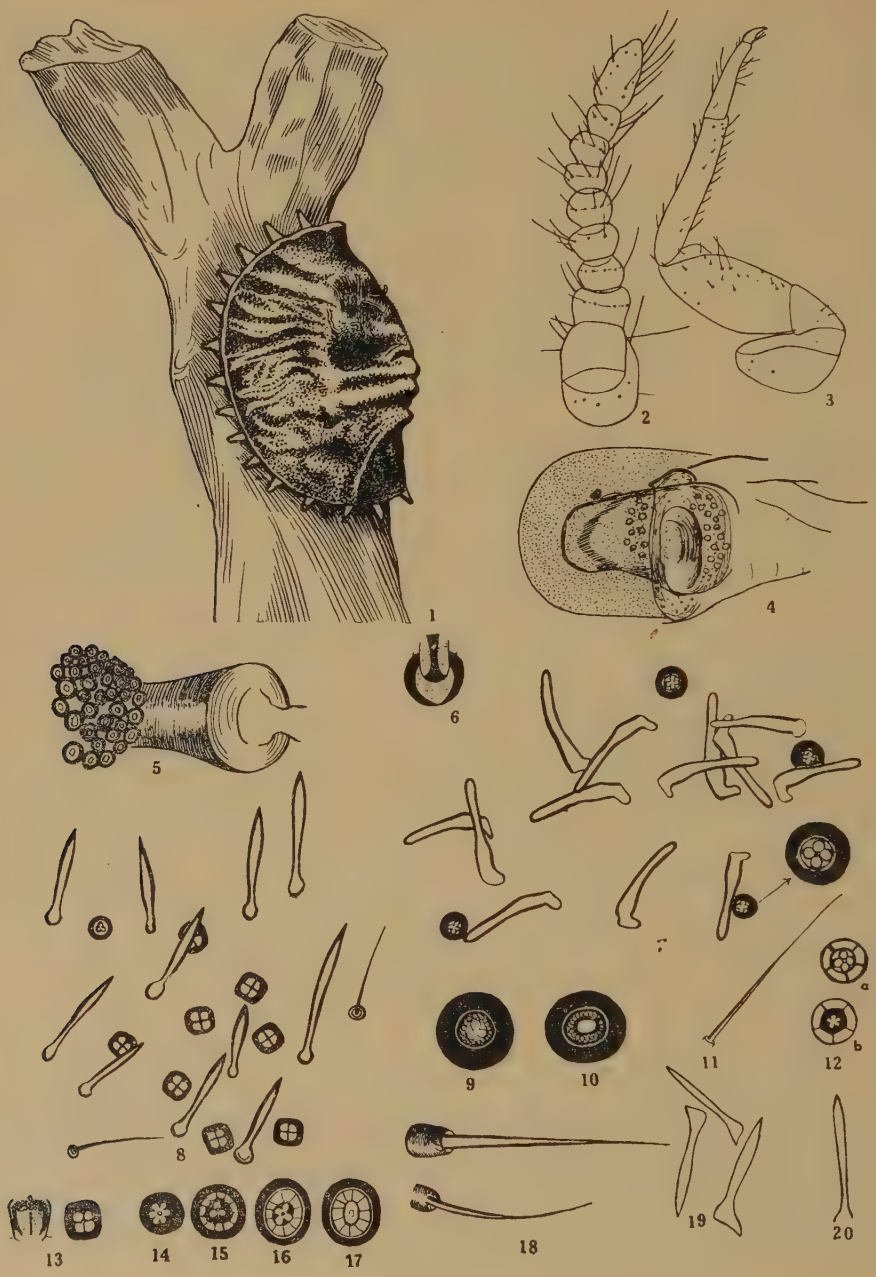

PLATE 2.—*Misracoccus xyliae* (Ramakrishna Ayyar).

(1) Sketch showing external features of the insect; (2) antenna; (3) leg; (4) thoracic spiracle; (5) dorsal spiracle; (6) dorsal pore (side view); (7) group of pores and setae on the dorsum; (8) group of pores and setae of the ventral band; (9) and (10) pores on the dorsum; (11) seta on the ventrum near the cicatrix; (12) pores on the ventrum near the cicatrix; (13) to (17) pores on the ventrum near the mouth parts; (18) dorsal setae; (19) setae near the anal region; (20) seta near the mouthparts.

PLATE 3.—*Misracoccus assamensis* sp. n.

(1) Outline of adult female showing mouthparts, antenna, legs, dorsal and ventral spiracles, ventral band of pores, genital and anal openings; (2) antenna; (3) leg; (4) ventral cicatrices; (5) thoracic spiracle; (6) dorsal spiracle; (7) dorsal seta; (8) pores of the ventral band; (9) to (12) ventral pores; (13) ventral setae; (14) pore on the ventrum near the genital region; (15) a group of pores from dorsal spiracle; (16) dorsal pore; (17) anal area showing the pores, setae and the anal tube.

and seven pairs of abdominal spiracles (fig. 1) with cerores near their opening (fig. 6). Anal tube short with a double row of pores at the opening (fig. 17). Ventral cicatrices numerous, arranged singly or in groups of two to seven all forming a semicircle with single median cicatrice larger than the others (fig. 4). Body dorsally and ventrally around the margin covered with a large number of closely-set stout setae having rounded slightly dilated tips (fig. 7). Anal region with a number of elongate setae and pores having a unilocular centre and plurilocular rim (fig. 17). Genital opening about the middle of the abdomen surrounded by slender, elongate setae and a cluster of pores similar to those found near the anal opening but more thinly chitinized. The different kinds of pores described under *Misracoccus xyliae* are also present in this species, but on the ventrum in the region of the cicatrices, pores with trilocular centre are in a majority as compared to those with quadrilocular centre. In *xyliae* the latter type of pores are more numerous.

This species can be distinguished from the other known species of the genus by the nine-segmented antennae. It can also be separated from *xyliae* by the difference in the shape of the marsupial band of setae.

Holotype.—A single female on slide in author's collection.

Paratypes.—A number of dry specimens in the author's collection. A single dry specimen also deposited in U.S. National Collection of Coccidae.

Hosts and distribution.—Collected by the author on a wild tree at Shillong, Assam Province, India.

Habit.—Females found attached to twigs. Body large, about 10–12 mm. in length, 5–7 mm. in width and 4–5 mm. in height.

Acknowledgments.

The author is deeply indebted to the Trustees of the British Museum (Natural History) and to Mr. F. Laing, Assistant Keeper, for permitting him to examine the Green and Newstead collections of Coccidae. Without this, the exact determinations of the species in the author's collection would have been impossible. He is also indebted to Dr. Harold Morrison for placing at his disposal for study all available species in the U.S. National Collection of Coccidae which are now included by the author in the genera *Perissopneumon* and *Misracoccus*.

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MORMOTOMYIA HIRSUTA AUSTEN (DIPTERA) AND ITS SYSTEMATIC POSITION.

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About 15 years ago the Commonwealth Institute of Entomology received from Mr. H. B. Sharpe two male specimens of a very remarkable fly with greatly reduced wings. These insects were studied by Major E. E. Austen and presented to the British Museum (Natural History). Austen recognized the species as new and founded on it a new family Mormotomyiidae, which he placed in the Acalyptrata, and which he considered as " perhaps distantly related to the family Borboridae." Nothing more became known until December, 1948, when Dr. V. G. L. van Someren, through whose indefatigable activities the knowledge of the East African insect world has been enriched so much, used the opportunity of a visit to this part of Kenya for an excursion to Ukazzi Hill, the typical locality of *Mormotomyia*, in the hope of discovering something about the biology of this interesting fly. Dr. van Someren succeeded in finding numerous adults of both sexes, larvae and pupae, and he also secured photographs of the locality and habitat. I am very grateful to Dr. van Someren that he has enabled me to describe the so far unknown female, full-grown larva and puparium, and to publish his observations. The material used in the preparation of this paper has been presented to the British Museum (Natural History).

Austen's description was remarkably exhaustive in view of the fact that two males in dry condition were all he had at his disposal. As far as the male is concerned, few additional remarks are therefore needed, but descriptions of the female and of the early stages can now be presented together with some notes on the biology and a more detailed discussion of the systematic position.

Mormotomyia hirsuta Austen.

Male secondary sexual characters and genitalia.—Frontal triangle of the male very large, interfrontalia consequently reduced to a pair of elongate wedge-shaped areas, which meet at anterior end. As in *Scatophaga*, long fluffy hair with wavy tips (described and figured by Austen) is a secondary sexual character of male, and concave ventral outline of the middle metatarsus (fig. 3*a*), also mentioned by Austen, is restricted to this sex.

Male genitalia (fig. 4) conspicuous by absence of a moveable pair of superior and inferior forcipes though 7th (8th) tergite broadly produced, enveloping penis and parameres. Posterior pair of parameres (Pp in fig. 4) carries a long seta, anterior pair (Pa) bare. Penis (A) ensheathed in a broad fulcrum (F in fig. 4), and of an unusual filiform shape with dense hairs and a bifurcate apical appendage (fig. 5).

Female.—Characters very similar to those of male. Head (fig. 1) with frontal triangle slightly smaller, so that interfrontalia are less reduced; eyes somewhat more broadly ovate. Mid tarsi (fig. 3*b*) similar to those of other legs. Abdomen stouter and tapered to apex, its integument glossy dark brown with only first two fused segments thinly dusted. Claws, empodium and pulvilli quite as long as in male. Hair everywhere sparser, stiffer, not wavy at tips, and some of hairs short. Fore and mid legs with only short hairs, hind femora and tibiae with a number of long hairs between the short ones. As a consequence female appears much darker and not fluffy.

Ovipositor (fig. 6) retractile, with terminal segments of abdomen not much modified.

Egg.—Deposited eggs have not been observed, but by dissection of a female with swollen abdomen, 29 obviously mature eggs were obtained. These have an unusual appearance (fig. 15), the outline being elliptical with a spindle-shaped cross-section. The flattened margins are somewhat raised, so that the egg has a convex and a partly concave side. On the former the marginal flange shows a fine raised striation and the disc three ribs, the outer two of which are slight and often indistinct. On the front end the micropyle (M) is visible. On the opposite end about 8 irregularly-spaced hyaline tubercles are seen on the flange close to the body of the egg, the largest of them being sometimes noticeable on the concave side as well. The latter side has three or four slight ribs, and the whole of the surface of the egg, convex and concave surface, disc and flange is covered by a honeycomb-like shagreen.

Larva (figs. 7, 8, 11–14). Of the general appearance and structure of the Schizophora, the first to seventh abdominal segments, however, each with three dorsal and ventral transverse folds which are much more strongly developed than is usual in the group. On meso- and metanotum similar but much weaker folds are present. The intermediate dorsal fold of each of these segments with three or four small membranous teat-like prominences on either side. There are two similar prominences on each lateral callosity from the metathorax to the seventh abdominal segment, the anterior prominencess of each segment being placed more ventrad. In addition, the ventral surface is furnished at either end of the middle fold of the first seven abdominal segments with a larger similar fleshy prominence (fig. 7). These increase in size posteriorly.

Mouth hooks of the bucco-pharyngeal skeleton (figs. 12 and 13) rather broadly separated, basal pieces (B) about as widely distant from each other. Ventral arms (V) shorter than the dorsal ones, with an angular dilation. Parastomal sclerites (P) present, long and well developed. Anterior spiracle with 18 lobes (fig. 11). Terminal disc of the eighth abdominal segment (fig. 14) very large and broad, projecting laterally beyond the basal half of the segment, with three large conical processes on each side, only the intermediate one being conspicuous and about as long as wide, the other two wider than long. Behind the anal opening a convex area with some spinules (fig. 14*b*) and on either side a curved thumb-shaped process with spinules on apical part (fig. 14*c*). The posterior spiracles (fig. 14*a*) are situated on the upper part of the terminal disc and are separated usually by less than their greater diameter. The three spiracular slots of the full-grown larva elliptical, straight, the paramedian ones of the two spiracles slightly diverging upwards almost parallel with each other, the outer ones very strongly diverging, almost in line with each other.

Puparium (fig. 9–10) with the characters of the larva, the anterior end, however, strongly flattened dorsoventrally, with the line of dehiscence following the lateral edge. The teat-shaped prominences sclerotized and appearing as small brown spines ; the lateral processes of the terminal disc strongly reduced, but the processes on either side of the anus strongly developed. Transverse folds of the body much less incised.

Biology.

The shape of the eggs renders it quite probable that they are pushed into cracks and below the outer edge of the masses of dung. On the other hand they would also be well adapted to being attached simply to the surface of the dung. The dissected eggs are obviously mature, and their contents do not reveal any sign of advanced development of the larva. It may therefore fairly safely be assumed that after a period of incubation a first instar will hatch. The third-stage larvae have been observed to live in the dung where they may feed either on the decaying organic matter itself or on its inhabitants (of which four specimens of what appears to be a *Musca*-larva were collected together with them). Keilin (1917), Munro (1925) and Muirhead Thomson

(1937) have pointed out a number of features which allow discrimination between saprophagous and carnivorous larvae of Cyclorrhapha. Thus saprophagous larvae have three free instars whilst in carnivorous species the number tends to be reduced. Saprophagous larvae have, like those of *Mormotomyia*, a softer, thinner integument, the basal piece of the bucco-pharyngeal skeleton less intensively and less evenly blackened and with ventral longitudinal ribs (R in fig. 12), paired triangular dental sclerites (instead of an arch-shaped single sclerite), no accessory oral paired bars, numerous lobes on the anterior spiracles (in carnivorous larvae about 4–5) and large posterior spiracles. It can be regarded as certain, therefore, that the larva of *Mormotomyia* feeds on the dung of the bats, in which it was found. When full-grown, the larvae leave the substrate and pupate on nearby stones in an upright position, in which they are securely fixed by the spinulose thumb-shaped processes on either side of the anus in collaboration with the asperate prominence behind the anus (as is evident from some pupae sent with parts of the rock to which they are attached).

The species occurs in a cleft from top to bottom in a large boulder on Ukazzi Hill (Garissa District, Kenya). This cave-like cleft, which is about a yard wide, with its horizontal and oblique side-cracks is inhabited by unidentified bats. When Dr. van Someren visited the spot, heavy rains had washed down large quantities of bat droppings into the bottom of the " cave " and into a recess in the rock, where they formed a sodden mass. " Literally hundreds of this curious fly swarmed on the walls and around the mass of bat dung ; males predominated, but hundreds of females were noted. On the rock margin around the soaking dung were hundreds of pupae, and from some of these flies were actually emerging and crawling up the walls." Some were seen *in copula*. Dr. van Someren tried in vain to obtain some of the bats for identification by firing into the cave. Only stones fell and more flies came floating down, the fall of the males being apparently much slowed down by the long hairs, and occurring in a slight spiral line. The lack of prestomal teeth and the large soft labella of the mouthparts (fig. 2) indicate that the adults must feed on readily-available liquid or semi-liquid matter, such as the juices of the excrements and perhaps sweat of the bats. Males allowed to crawl on the back of the hand were seen by Dr. van Someren to apply their mouthparts to the skin and " seemed to be interested only in surface sweat."

Systematic Position.

The rich material now available encourages a re-examination of the systematic position. Austen's description and figure leave no doubt that the fly belongs to the Brachycera. Although the general appearance has justly induced Austen to place it in Schizophora, the text of his paper does not contain proof of this position. However, a front view of the head shows the ptilinal suture fully developed, and if the broad jowls of a specimen in alcohol are pressed down with a pin, the clypeus falls forward, hinging at the mouth-margin, and the ptilinum becomes visible between the anterior end of the frons and the base of the antennae (fig. 1, P).

The strongly developed cleft of the second antennal segment (fig. 1, C), absence of a row of hypopleural setae (though there are some irregularly-

arranged hairs on the upper part), and the undeveloped postscutellum would take *Mormotomyia* next to MUSCIDAE and CORDYLURIDAE in any key to the families of Diptera, and the reduction of the lower calyptra, the number of free abdominal segments, the dichoptic male, and the abundance of hair would make the genus appear most closely related to the latter family.

It is a somewhat different question, however, whether, and to what extent, this also indicates its phylogenetic relationship. If *Mormotomyia* belongs to the Calyptrata series or is transitional between it and the Acalyptrata, there can be little doubt that the CORDYLURIDAE are its closest allies. It is thus the question whether *Mormotomyia* is a Calyptrate or an Acalyptrate which is of decisive importance for its exact systematic position.

The name Calyptrata (" Calypteratae ") was created by Robineau-Desvoidy (1830) for the first " gens " of his MYODARIAE (= Schizophora) and refers to the large calyptrae found (normally) in TACHINIDAE, CALLIPHORIDAE and MUSCINAE. His second gens was the MESOMYDAE, containing the ANTHOMYIIDAE *s.l.* with " calypta jam minora " whilst in the other seven subfamilies the " calypta " are " minima, or quasi nulla " or " nulla." These seven groups are what later has been called Acalyptrata, and they are headed by the " SCATOPHAGINAE," a mixture of CORDYLURIDAE, DRYOMYZIDAE, HELOMYZIDAE, etc. Although the name Calyptrata has been retained by most modern Dipterists, the MESOMYDAE have been fused with this group long since, and even the SCATOPHAGIDAE now belong to the systematic aggregate Calyptrata in spite of the fact that their calyptrae are very small, all transitions being found in the ANTHOMYIINAE (in the wider sense). The calyptrae, thus, are no longer a main characteristic of the Calyptratae (nor any other of the characters used by Robineau-Desvoidy), and the fact that in *Mormotomyia* the calyptrae are reduced to folds similar to the lower calyptra in *Scatophaga* means very little, especially in view of the reduced size and structure of the wing.

The antennal cleft, as explained above, is of a typically calyptrate formation. When introducing this character, Malloch (1919) published an additional criterion, that of the position of the abdominal spiracles. In Calyptrata these are situated in the tergites (except in some male SCATOPHAGIDAE and FANNIINAE), whilst in Acalyptrata they are normally (except in some EPHYDRIDAE, some DRYOMYZIDAE, CHLOROPIDAE, etc.) placed in the membrane connecting the tergites and ventrites. Apart from the fact that this character is subject to definite exceptions, *Mormotomyia* (figs. 4 and 6) would appear by it to be intermediate between the two sections. The male genitalia (fig. 4) are unusual in lacking the superior and inferior forcipes, which are usually so strongly developed in

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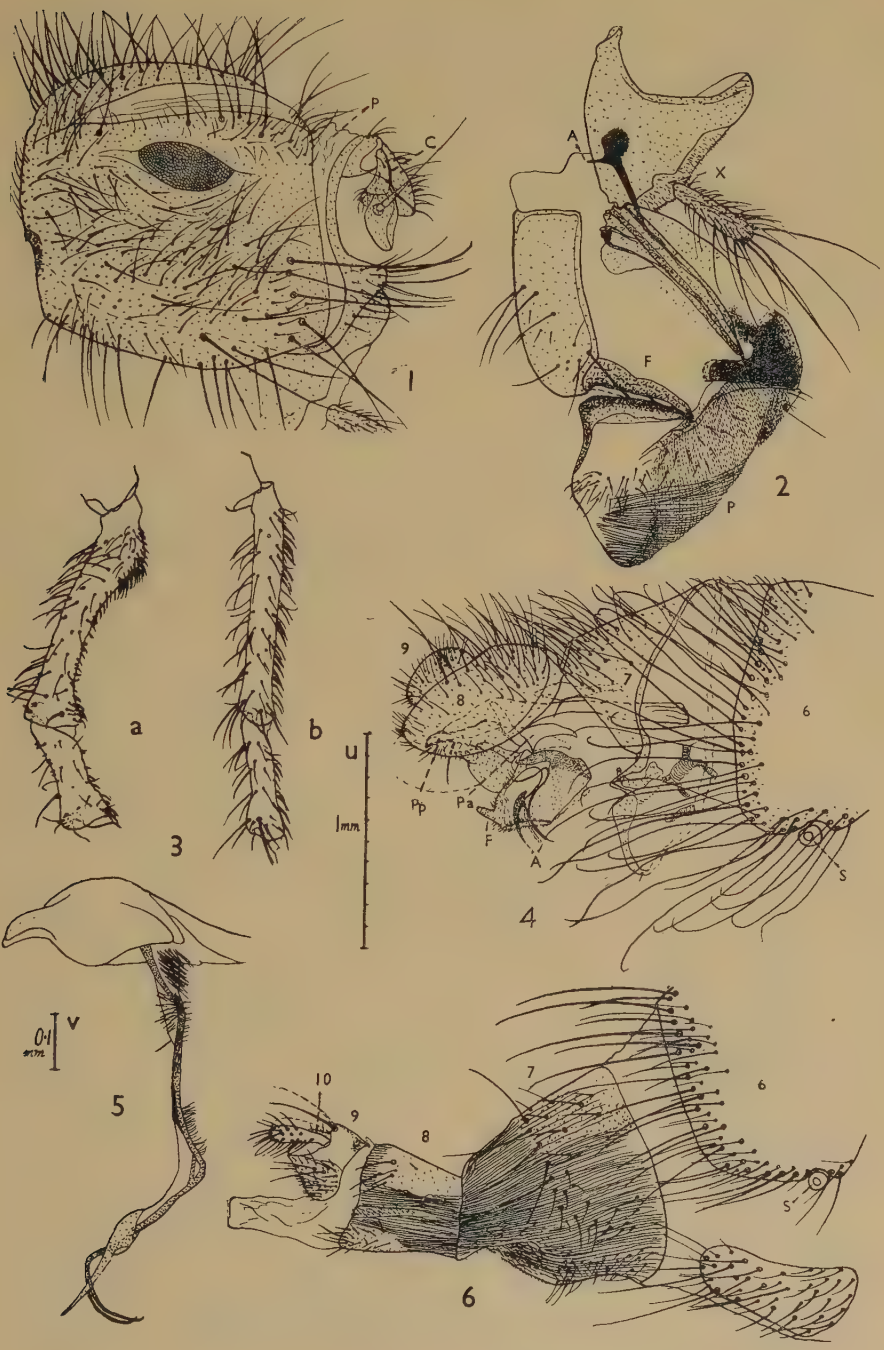
All figures concern *Mormotomyia hirsuta* Austen, and all were made with a Leitz microscope and camera lucida. The first number behind the " L " refers to the eye-piece, the second to the objective used, whilst the following letter points to the scale drawn under the same magnification.

FIGS. 1–6.—(1) Head of female. P, ptilinum ; C, cleft of second antennal segment. L 0, 3, u. (2) Proboscis of female. A, ventral appendage of stipes ; F, furca ; P, pseudotracheae ; X, area of palpiger. L 0, 3, u. (3) Basal two segments of mid tarsus (*a*) of male, (*b*) of female. L 0, 3, u. (4) Male abdomen, terminal segments. 6 etc., sixth, apparent fifth, segment ; A, penis ; F, fulcrum of penis ; Pa, anterior paramere ; Pp, posterior paramere ; S, spiracle of sixth segment. L 0, 3, u. (5) Penis. L 4, 3, v. (6) Female abdomen, terminal segments. Abbreviations as in fig. 4. L 0, 3, u.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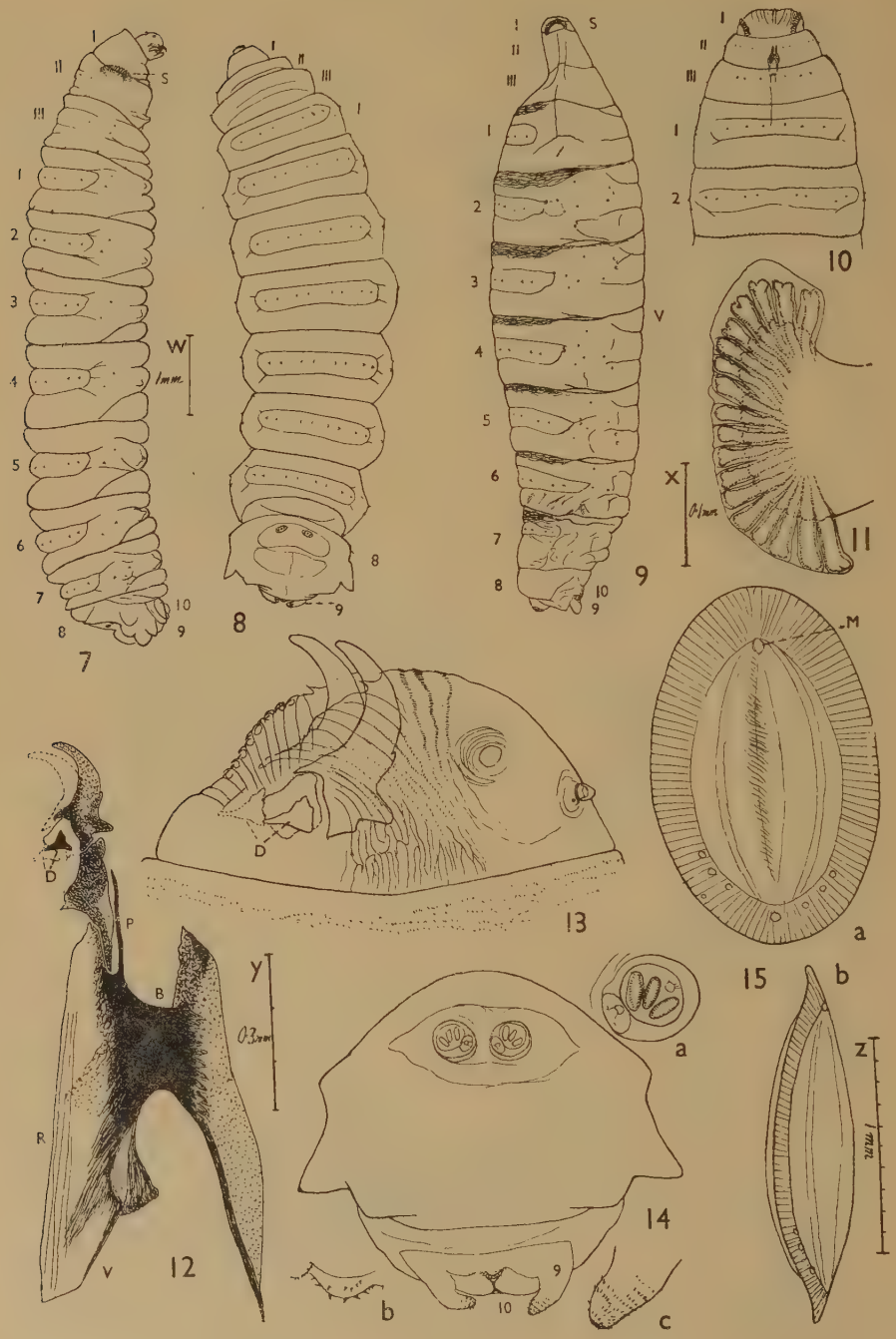
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Schizophora. Unfortunately, the classification has never been checked on a larger scale from a study of these structures, and it is therefore not yet possible to define a calyptrate and acalyptrate type of genitalia. Mr. J. E. Collin informs me, however, that he recognizes definite similarities with the acalyptrate family THYREOPHORIDAE. As the female genital segments (fig. 6) on the other hand are of the weakly sclerotized retractile type in *Mormotomyia*, whilst in THYREOPHORIDAE they are similar to those of TRYPETIDAE and LONCHAEIDAE, this similarity is certainly not indicated in the female sex. According to Hennig (1941) a relationship with the THYREOPHORIDAE would also imply one with DRYOMYZIDAE, PALLOPTERIDAE and PIOPHILIDAE. Special importance for the distinction between Calyptrata and Acalyptrata has been attributed to the mouthparts, and there is no doubt that typical members of both groups are very clearly distinguished by the presence of the hyoid (= theca of Frey, 1921). In addition, Frey gives in his classical paper (p. 207) about 10 other characters, in which the Calyptrata including CORDYLURIDAE differ from the Acalyptrata, allowing for a few exceptions among the latter. Frey did not study *Pogonota*, and in this genus (to some extent in some other Cordylurid genera) many of the more important calyptrate characters are absent. Thus both in *Pogonota* and *Mormotomyia* the palpiger is devoid of setae, the furca is biramous, there is no free sclerite interposed between furca and mentum plate, and the pseudotracheae do not lead into a dorsal and ventral main channel. On the other hand, *Mormotomyia* deviates in the direction of the Acalyptrata from all CORDYLURIDAE studied by me by the presence of a ventral appendage of the stipes (A in fig. 2), the absence of peristomal teeth, and the absence of the hyoid.

It may thus be said that although the key-characters of the adult are those of Calyptrata and would bring *Mormotomyia* near to the CORDYLURIDAE, the morphological characters are, as far as can be judged, more acalyptrate. As the CORDYLURIDAE show in many ways deviations from more typical Calyptrata in the same direction, it would seem that the relationship of *Mormotomyia* is with the CORDYLURIDAE, but tending even more towards the Acalyptrata.

As to the early stages and biology, the structure of the egg and the erect poise of the pupae do not to my knowledge occur in any of the related families. The obviously dung-eating habits of the larva would agree with those of many CORDYLURIDAE, and the general structure of the larva would also seem to point in this direction by the presence of a broad terminal disc surrounded by large conical lobes, of three asperate prominences behind the anus, and of distinct parastomal sclerites. The not-tubular hind spiracles and the

FIGS. 7–15.—(7) Full-grown larva, lateral view. I, II, III, thoracic segments; 1, 2, etc., abdominal segments; S, anterior spiracle. L 4, 0, w. (8) Full-grown larva, dorsal view. Numbers as in fig. 7. L 4, 0, w. (9) Puparium, lateral view. Abbreviations as in fig. 7; V, ventral surface. L 4, 0, w. (10) Puparium, dorsal surface of anterior part. Numbers as in fig. 7. L 4, 0, w. (11) Anterior spiracle of larva. L 0, 6, x. (12) Buccopharyngeal skeleton of larva, lateral view. B, basal piece; D, dental sclerites; P, parastomal sclerite; R, ribs; V, ventral arm. L 4, 3, y. (13) Head of larva, lateral view. D, dental sclerites. L 0, 6, x. (14) Terminal disc of abdomen of larva. L 0, 3, z. (*a*) Spiracle of eighth abdominal segment; (*b*) Asperate tubercle behind anus; (*c*) Asperate thumb-like process of ninth abdominal segment. *a* to *c*, L 4, 3, y. (15) Mature egg, dissected from female abdomen. (*a*) view of the convex side; (*b*) lateral view. M, micropyle. L. 0, 3, z.

angular dilation of the ventral arm of the bucco-pharyngeal skeleton also are characters which the larvae share with CORDYLURIDAE and ANTHOMYIINAE but not with Acalyptrata (see Zimin, 1948 : 19–20).

The early stages and biology would thus seem to suggest even more clearly a close relationship with CORDYLURIDAE. There are, however, enough unusual characters in each stage to prevent the genus from being included in this family and to support the retention of Austen's family MORMOTOMYIIDAE, which should thus be placed between CORDYLURIDAE and Acalyptrata.

SUMMARY.

The morphology of the female, genitalia of the male, early stages and biology of *Mormotomyia* are described and its systematic position discussed.

It is considered that the genus represents a well-founded family intermediate between the CORDYLURIDAE and the Acalyptrata.

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